APPLICATION

FOR

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TITLE: SYSTEM AND METHOD FOR RELIABLE BILLING OF
CONTENT DELIVERED OVER NETWORKS

APPLICANT: JASON F. HUNZINGER

SYSTEM AND METHOD FOR RELIABLE BILLING OF CONTENT DELIVERED OVER NETWORKS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001]   This application is claims priority to U.S. Provisional Application Serial No. 60/252,994, entitled RELIABLE BILLING OF CONTENT DELIVERED ON UNRELIABLE NETWORKS and filed on November 22, 2000.

BACKGROUND

[0002]   The sale of content over the Internet is becoming an important source of revenue for the Internet industry. A content provider may deliver text, video, music or other forms of content to a requesting consumer and bill the consumer for the delivered content.

[0003]   For a content usage-based billing system to be efficient, the content providers must reliably receive payment for successfully delivered content, and the consumers must reliably receive the content they are billed for in a complete and uncorrupted form.

[0004]   Wireless networks are used to connect mobile devices, such as laptops and handheld devices such as mobile phones, pagers, two-way radios, and PDAs (Personal Digital Assistants), to the Internet. Such mobile devices

may be used to purchase content from content providers over the Internet. However, wireless networks may not always be reliable due to the dynamics of mobility and limited bandwidth available on wireless links. Also, wireless networks may have higher error rates and more frequent disconnections than wired networks. These reliability issues may complicate the implementation of efficient content usage-based billing in wireless networks.

SUMMARY

[0005]   In an embodiment, a mobile device in a wireless network may request content from a content provider connected to the Internet. The content may include, for example, text, images, video and/or audio information, and script(s) and program(s). A gateway device may connect the mobile devices in the wireless network to the Internet. The wireless communication link between the gateway device and a mobile device may be less reliable that the link between the gateway device and the content provider via the Internet.

[0006]   The content provider may send content to the mobile device via the gateway device in response to a request message sent by the mobile device. Upon successful receipt of the content, the mobile device may issue a

delivery confirmation acknowledgment (C-ACK) to the gateway device. In response to receiving the C-ACK, the gateway device or content provider may issue a display acknowledgment (D-ACK) to the mobile device. A billing system may then bill the requesting user for the delivered content.

[0007] The mobile device may not display or otherwise utilize the received content until it receives the D-ACK. For example, the content may be encrypted and the D-ACK may include the decryption key. Alternatively, the content may be sent with a script or program that disables the mobile device from displaying or otherwise utilizing the received content until a D-ACK is received.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Figure 1 is a networked computer system which supports reliable content usage-based billing.

[0009] Figures 2A and 2B are flowcharts describing a content usage-based billing operation.

[0010] Figure 3 is a block diagram illustrating a protocol for reliable content usage-based billing.

DETAILED DESCRIPTION

[0011]   Figure 1 illustrates a networked computer system 100 which enables a content usage-based billing technique according to an embodiment. The networked computer system may include a wireless communication network 102 that supports and manages wireless connections between mobile devices 104 and the Internet 106 or a similar networked computer system. The wireless communication network may utilize the Wireless Application Protocol (WAP), a specification that allows users to access information from a network via handheld wireless devices in a secure manner.

[0012]   The mobile devices 104 may include antennas 108 or optical transceivers for receiving and transmitting wireless signals, such as radio frequency (RF) or infrared (IR) signals. The mobile devices 104 may include display screens 110, speakers and/or jacks audio output, and keypads 112 for inputting user commands. The mobile devices 104 may include, for example, mobile phones, pagers, two-way radios, and PDAs (Personal Digital Assistants).

[0013]   A gateway device 120 in the wireless network 102 may be used to connect the mobile devices 104 to the Internet 106. The gateway device 120 communicates with the mobile devices via wireless connections and with the

Internet via a more reliable connection, e.g., an

unshielded twisted pair (UTP), fiber optic or co-axial

cable or a combination of such cables. The gateway device

120 may translate data between WAP and TCP/IP (Transmission

Control Protocol/Internet Protocol) formats utilized in the

wireless network 102 and the Internet 106, respectively.

[0014]   The mobile devices 104 may be used to purchase

content from content providers over the Internet. A

content provider 122 may deliver text, video, music,

scripts, programs or other forms of content to the

requesting consumer via a mobile device 104 and bill the

consumer for the delivered content. The content may also

be delivered as part of a service, such as financial,

entertainment, and location services.

[0015]   In an effective content usage-based billing

system, both content delivery to the consumer and billing

by the content provider are both performed reliably and

consistently. However, wireless networks may not always be

reliable due to the dynamics of mobility and limited

bandwidth available on wireless links. Also, wireless

networks may have higher error rates and more frequent

disconnections than wired networks. In a content usage-

based billing system, such unreliability may cause a

consumer to be billed for content that was not delivered or

incompletely delivered. The content provider may not be certain that the consumer has received the content, and hence may not be able to properly bill the consumer. These occurrences may result in consumer dissatisfaction, complaints, repeated delivery attempts (and the resultant increase in network traffic), and loss in revenue.

[0016]   Figure 2 is a flowchart describing an operation 200 for fair and reliable billing of content delivery. A mobile device 302 requests content from a content provider 304 by transmitting a request message 306 identifying the desired content over a wireless connection 308 (block 202), as shown in Figure 3. A gateway device 310 receives the request message over the wireless connection 308 (block 204), performs any necessary reformatting of the data, and forwards the request message 306 to the content provider 304 over an Internet connection 312 using a reliable transmission protocol, such as TCP/IP (block 206).

[0017]   Upon receipt of the request message 306 (block 208), the content provider 304 may authenticate the user (block 210) and then either reject the request (block 212) or send the requested content 314 (block 214). The mobile device sends back a content-delivery acknowledgment (C-ACK) 320 (block 218) once the complete information entity, e.g., a page (TCP/IP) or deck or card (WAP), has been received

and stored successfully and uncorrupted (block 216). The

mobile device and content provider may use a Cyclic

Redundancy Check (CRC), a TCP packet length indicator, an

FTP file size indicator or any other well known method of

allowing a recipient to determine that it has received a

complete information entity.

[0018]   Upon receipt of the C-ACK from the mobile device

302, a network component may issue a display-acknowledgment

(D-ACK) 330. The mobile device may not display or

otherwise manifest the delivered content (e.g., audio

output) until the D-ACK is received (block 220). If the

gateway device 120 or content provider 122 does not receive

a C-ACK from the mobile device after a timeout period after

transmitting the content, that entity may retransmit the

content (block 240).

[0019]   The D-ACK may be a OSI (Open System

Interconnection) Layer 2 (Data Link) acknowledgment of the

C-ACK bearing message. To account for losses over the

wireless connection 308, the mobile device may send one or

more C-ACKs if an expected D-ACK is not received within a

timeout period (block 222).

[0020]   Although wireless connection 308 may not be

reliable, the Internet connection 312 is considered

reliable and any data received by the gateway device from

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the wireless connection 308, e.g., a request message or C-ACK, is assumed to be successfully transmitted and received by the content provider 304. Accordingly, the network component may be the content provider 304, the gateway 310, or another network component on the other side of the unreliable link, i.e., the wireless connection 308. If acknowledged in this way, it is highly probable that the C-ACK reaches the billing entity because the remainder of the link is highly. Upon receiving a C-ACK, a billing system 150 may check for funds and handles the payment for the transaction.

[0021]   As described above, the mobile device 302 does not display the delivered content until a D-ACK is received from the network component. The content may be encrypted and require a key contained in the D-ACK, or the information may be weakly scrambled or encrypted. Alternatively, the mobile device 302 may be configured to suppress display or other manifestation (e.g., audio output or printing) of the content until the D-ACK is received.

[0022]   The content may be delivered to the mobile device in an information package, which may also include billing script(s) or program(s), conditional display script(s) or program(s), and tags for other purposes such as identification, billing, and tracking. The tags and

scripts or programs may be included by the content provider

or appended, attached, or packaged by other entities such

as the gateway 12 or billing system 150. The billing

scripts may cause the mobile device to implement the C-ACK

acknowledgment protocol and identification of the mobile

device or user. The conditional display scripts may cause

the mobile device 104 to store and/or hide all or part of

the content until the D-ACK is received.

[0023]   Users could potentially discover a way to view

internally stored content before a D-ACK is received or to

block the billing or conditional display scripts and

thereby obtain free content. A monitoring system 160 may

be used to keep track of the statistics of content delivery

and C-ACKS from individual users. To protect user privacy,

devices or users may be identified with arbitrary

identifiers which are associated with the appropriate

device or user at the monitoring system, content provider,

billing system, gateway, or other entity. Before providing

content, the content provider 122 or billing system 150 (or

other entity) may check with the monitoring system 160 to

see if a particular user (identified by the anonymous or

non-anonymous ID) has a bad history of not acknowledging

delivery (block 250). If this is the case, the user's

request may be denied (block 212) because the user is not

trusted to pay, or the link is unreliable and there is a low probability of delivery and confirmation. Figure 1 depicts the content provider 122, billing system 150 and monitoring system 160 as separate entities connected to the internet 106, however it is well understood in the art that some or all of their functions could be collocated on the same device.

[0024] The techniques described here may be implemented in hardware or software, or a combination of the two. The techniques may be implemented in computer programs executed on one or more programmable computers that may each includes a processor, a storage medium readable by the processor (including volatile and non-volatile memory and/or storage elements), and suitable input and output devices. The programmable computers may be either general-purpose computers or special-purpose, embedded systems.

[0025] A number of embodiments of the present invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. For example, blocks in the flowchart used to describe the content usage-based operation may be skipped or performed in a different order and produce desirable results. Accordingly, other embodiments are within the scope of the following claims.